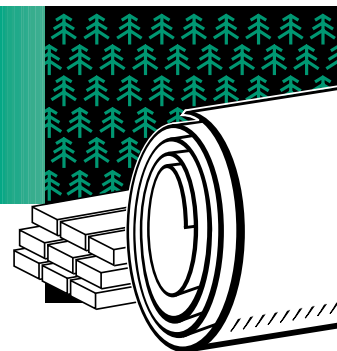


# FOREST PRODUCTS

## Project Fact Sheet

### AN EFFICIENT AND ENVIRONMENTALLY BENIGN TECHNOLOGY FOR PAPERMAKING



#### BENEFITS

- Could save 175 billion Btu of electricity per installation annually
- Could save the paper industry 1.0 trillion Btu annually by 2010
- Reduces electrical energy consumption by 30% in the mechanical pulping process
- Improves strength characteristics of mechanically produced pulp
- Could reduce the amount of air and water pollutants compared with conventional pulping
- Decreases reliance on blending chemical and mechanical pulp

#### APPLICATIONS

The use of fungus as a prepulping treatment is particularly appropriate for mechanical wood-pulping facilities. Biopulping is the treatment of wood chips with a fungus prior to mechanical pulping. As a result, wood chips are softened, so less electrical energy is required for pulping and a stronger product is produced.

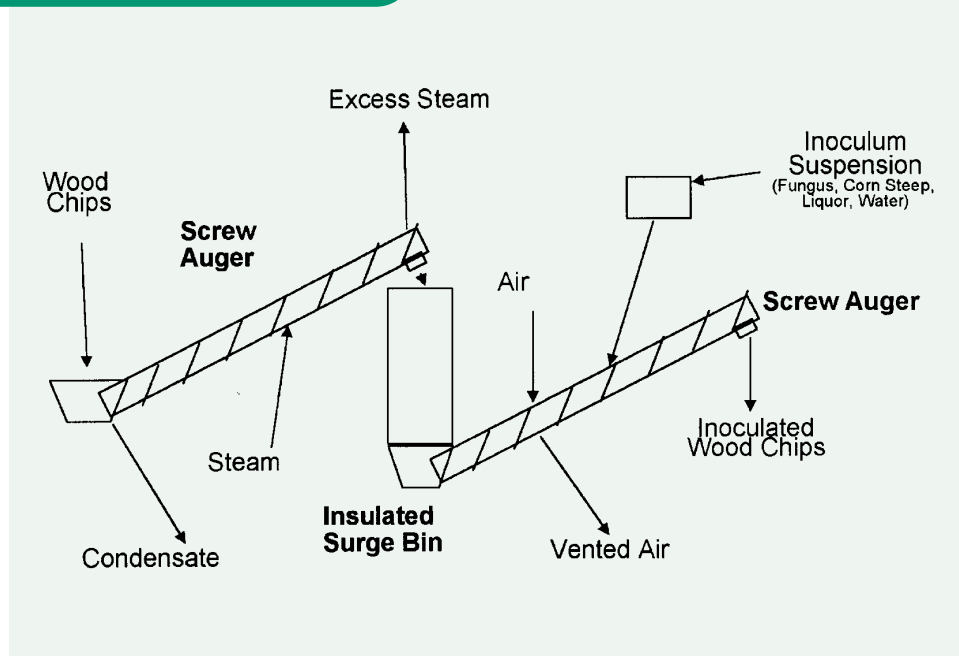
#### A NEW BIOLOGICAL PRETREATMENT OF WOOD CHIPS SAVES ENERGY AND REDUCES POLLUTANTS IN MECHANICAL PULP MILLS

About 25% of the wood pulp produced in the world is created using the mechanical pulping method. Mechanical pulping is electrically energy-intensive and yields paper with less strength compared with paper produced from chemical pulping processes. These disadvantages limit the use of mechanical pulp in many grades of paper.

In many cases, chemical (Kraft) pulp is blended with mechanical pulp to add strength to the paper. However, chemical pulp is expensive and produces large amounts of both air and water pollutants in its processing.

A new technology offers a biopulping process with the potential to solve these problems. Biopulping treats wood chips with a natural wood-decaying fungus prior to mechanical pulping. This process can save substantial amounts of electricity, improve paper quality, reduce the environmental impact of pulping, and enhance economic competitiveness.

#### BIOPULPING TREATMENT PROCESS



The new biological pretreatment process, being developed by Biopulping International, Inc., improves paper strength while reducing energy and emissions.



## Project Description

**Goal:** Confirm prior testing of the technology through scale-up and testing of a prototype system in cooperation with a mechanical pulp mill.

Under the fungal pretreatment method, wood chips are steamed, cooled, inoculated with a specific natural fungus, and incubated for two weeks. During the incubation period, the fungus colonizes the surface and inside of the wood chips and secretes enzymes that degrade the lignin in the wood and soften the chips.

Wood chips treated with this process require less electrical energy in the pulping process and produce stronger pulp. The innovative features of this biopulping process are the identification of a specific fungus, the selection of an inexpensive fungal nutrient, and the development of a system that can produce treated chips in a continuous commercial operation.

Biopulping International, Inc., is developing this new technology with the help of a grant funded by the Inventions and Innovation Program in the U.S. Department of Energy's Office of Industrial Technologies.

## Progress and Milestones

- Design, procure, assemble, and test the necessary equipment for the prototype unit.
- Using a professional environmental group, test and study the amount of volatile organic compounds leaving the inoculated chip pile.
- Analyze data on energy consumption, paper strength, optical properties, and volatile organic compound emissions.
- Revisit the market analysis and revise the business plan.

## Economics and Commercial Potential

The use of fungus prior to pulping offers an attractive opportunity for mechanical wood pulp facilities. This technology could save an estimated 30% of the energy consumed in refining the mechanical pulp. The technology also improves paper strength and could reduce the emissions of volatile organic compounds.

According to the data published in the industry-wide Pulp and Paper Directory, over 627 mechanical pulp mills operate today. These mills average 242 tons per day of pulp production. Biopulping International, Inc., projects that 12 mechanical pulp mills will adopt the technology soon after market entry and that 20% of all mechanical pulp mills will adopt the biopulping technology over 10 years. This technology could save 175 billion Btu of electricity per installation each year. First sales for the technology are expected by 2003. Based on 10% market penetration by 2010, annual savings could be 1.0 trillion Btu with 6 mechanical pulping mills served. Market penetration of 30% by 2020 could save 3.0 trillion Btu from operations at 17 mills engaged in mechanical pulping.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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## INDUSTRY OF THE FUTURE—FOREST PRODUCTS AND AGENDA 2020

*In November 1994, DOE's Secretary of Energy and the Chairman of the American Forest and Paper Association signed a compact, establishing a research partnership involving the forest products industry and DOE. A key feature of this partnership was a strategic technology plan, **Agenda 2020: A Technology Vision and Research Agenda for America's Forest, Wood, and Paper Industry**. Agenda 2020 includes goals for the research partnership and a plan to address the industry's needs in six critical areas:*

- Energy performance
- Environmental performance
- Capital effectiveness
- Recycling
- Sensors and controls
- Sustainable forestry

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